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Kilp

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(54) **MESSAGING SYSTEM WITH AUTOMATIC PROXY SERVICE**

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(52) **U.S. Cl.** **379/201.06**; 379/88.11; 379/88.12; 379/201.07; 379/201.1; 379/207.12; 379/209.01

(58) **Field of Search** 379/38, 45, 67.1, 379/69, 70, 78, 88.11, 88.12, 88.17, 88.15, 93.09, 93.23, 93.35, 93.37, 201.06, 201.07, 201.08, 201.01, 207.12, 209.01; 455/445, 461, 412, 413

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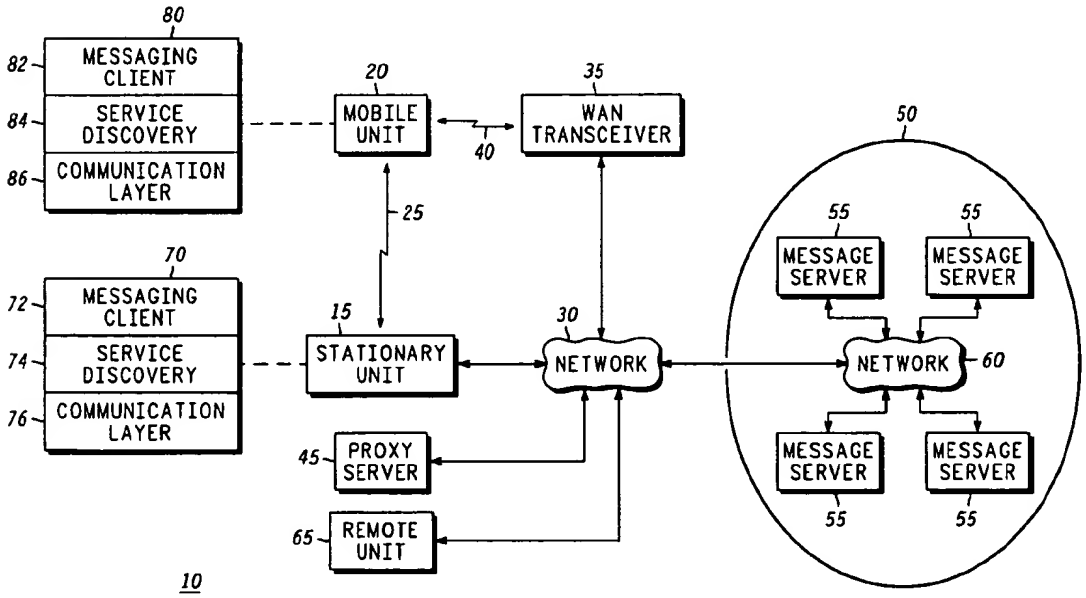
(57) **ABSTRACT**

A communications system includes a stationary unit, a mobile unit, and a proxy server. The stationary unit is adapted to send and receive messages. The mobile unit is adapted to establish a communication link with the stationary unit, and the mobile unit is also adapted to send and receive messages. The proxy server is adapted to route messages to one of the stationary unit and the mobile unit based on a status of the communication link between the stationary unit and the mobile unit. A method for routing messages includes monitoring the status of a communication link between a mobile unit and a stationary unit. A message is received and routed to one of the stationary unit and the mobile unit based on the status of the communication link.

20 Claims, 3 Drawing Sheets



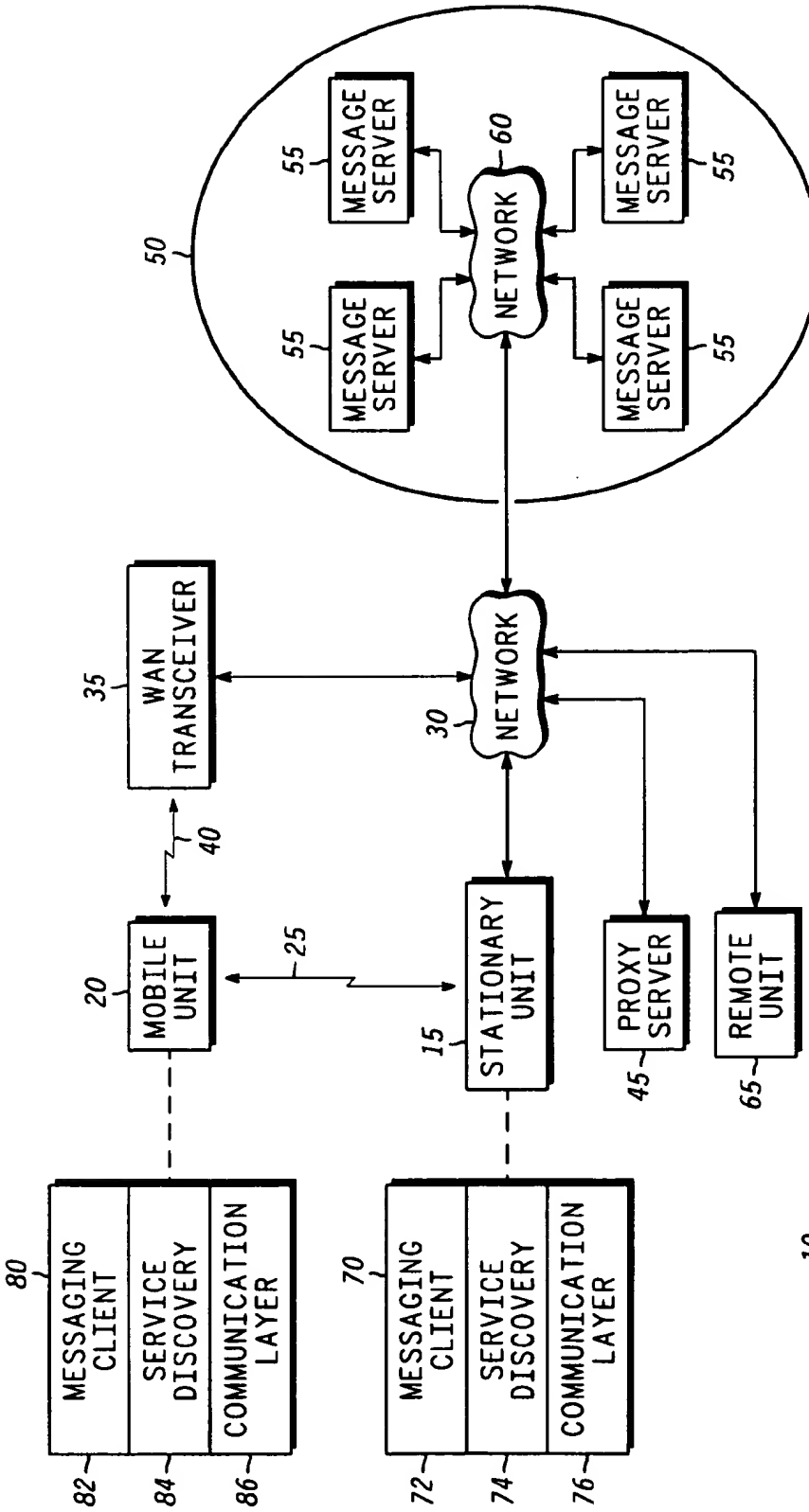
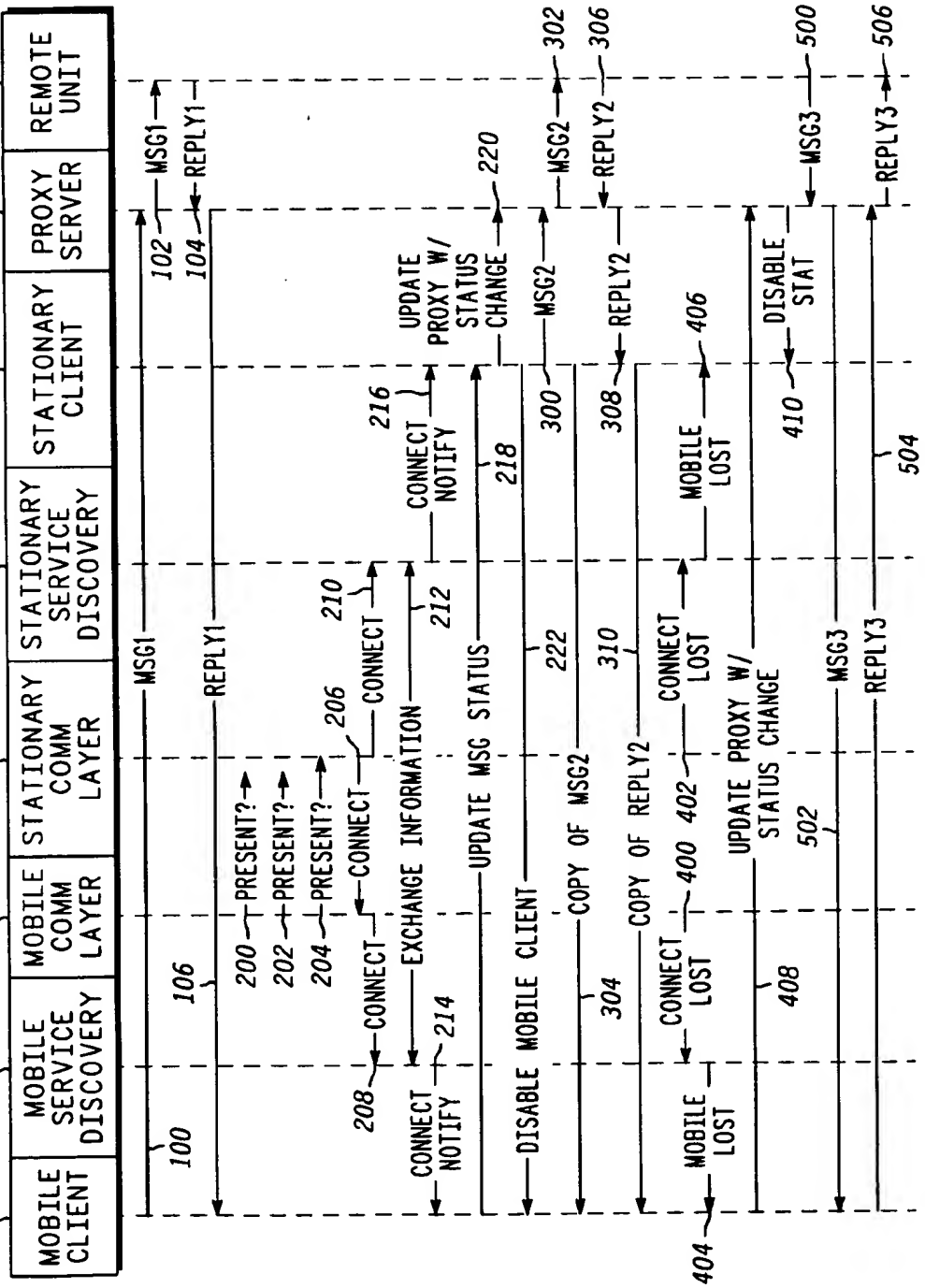

50
55
MESSAGE SERVER
55
MESSAGE SERVER
55
MESSAGE SERVER
55
MESSAGE SERVER
60
NETWORK
30
NETWORK
35
WAN TRANSCEIVER
40
20
MOBILE UNIT
25
15
STATIONARY UNIT
45
PROXY SERVER
65
REMOTE UNIT
80
MESSAGING CLIENT
SERVICE DISCOVERY
COMMUNICATION LAYER
82
84
86
70
MESSAGING CLIENT
SERVICE DISCOVERY
COMMUNICATION LAYER
72
74
76
10

FIG. 1

FIG. 2


MOBILE CLIENT
MOBILE SERVICE DISCOVERY
MOBILE COMM LAYER
STATIONARY COMM LAYER
STATIONARY SERVICE DISCOVERY
STATIONARY CLIENT
PROXY SERVER
REMOTE UNIT
82
84
86
76
74
72
45
65
100
MSG1
102
MSG1
106
REPLY1
104
REPLY1
200
PRESENT?
202
PRESENT?
204
PRESENT?
206
208
CONNECT
CONNECT
210
CONNECT
216
CONNECT NOTIFY
EXCHANGE INFORMATION
212
UPDATE PROXY W/ STATUS CHANGE
220
214
CONNECT NOTIFY
UPDATE MSG STATUS
218
DISABLE MOBILE CLIENT
222
MSG2
300
302
COPY OF MSG2
304
REPLY2
308
306
COPY OF REPLY2
310
MSG2
REPLY2
CONNECT
400
402
CONNECT
LOST
MOBILE
LOST
406
404
MOBILE
LOST
UPDATE PROXY W/ STATUS CHANGE
408
502
DISABLE STAT
410
MSG3
500
MSG3
REPLY3
504
REPLY3
506

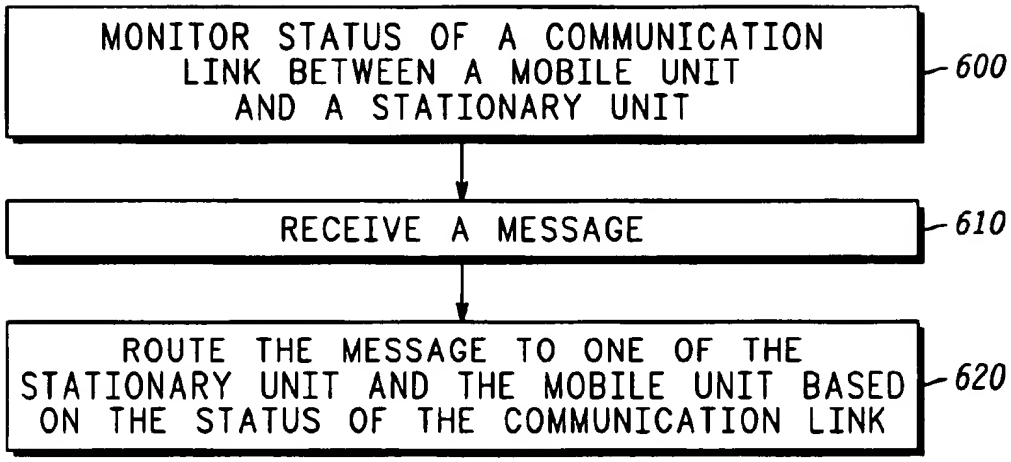

MONITOR STATUS OF A COMMUNICATION LINK BETWEEN A MOBILE UNIT AND A STATIONARY UNIT
600
RECEIVE A MESSAGE
610
ROUTE THE MESSAGE TO ONE OF THE STATIONARY UNIT AND THE MOBILE UNIT BASED ON THE STATUS OF THE COMMUNICATION LINK
620

FIG. 3

MESSAGING SYSTEM WITH AUTOMATIC PROXY SERVICE

FIELD OF THE INVENTION

This invention relates generally to the field of personal communications and, more particularly, to a messaging system having an automatic proxy service for forwarding messages to a mobile unit when a user is out of range of a base unit.

BACKGROUND OF THE INVENTION

The proliferation of computer devices and the interconnectivity provided by global networks, such as the Internet, have provided many opportunities for changing the nature of business and personal communications. Electronic message systems, such as electronic mail (e-mail), voice mail, and instant messaging (IM) have provided convenient tools for contacting people or groups of people efficiently. Such electronic messaging systems provide a fast and inexpensive method to communicate and collaborate. Reliance on these messaging systems for communication has increased greatly in recent years, and the trend is likely to continue.

Due to the volume of electronic messages some individuals receive, they often feel "lost" without access to their messages. Mobile communication devices, such as personal data assistants (PDAs), notebook computers, pagers, cellular phones, etc. are commonly equipped with functionality for retrieving and responding to electronic messages. When away from the office, an individual may configure the mobile device to receive incoming messages in lieu of the normal message service installed in the user's office.

One particular messaging system that requires a physical point of presence is an IM system. An individual uses a computer to log into the message server of an IM provider, such as America On Line, Yahoo, or Microsoft Network. For example, the individual may log in at a desktop computer at the office. During the log in process, the message server notes the user name and IP address of the individual and registers that user name as being available to other users of the IM system. A different individual can access a list of "friends" to determine who is available on the IM system and send electronic messages to the friend's computer.

Various IM software applications allow the user to set a status flag regarding current availability. For example, typical status flags include available, busy, on the telephone, out to lunch, etc. Based on the availability flag, a different user can decide whether to send an electronic message or to wait until the individual is available.

One problem with the use of status flags is that individuals often forget to update their availability status. Typically, a user runs a plurality of computer applications simultaneously. The IM software may not always be visible, and the user may forget to change the status flag when the phone rings, the user gets called out of the office, the user leaves to get a cup of coffee, or the like. Hence, a user's status flag may indicate available, when in actuality, the user is not available. This situation may lead to frustration on the part of a sender trying to contact the user. Moreover, if the message is urgent, the errant availability flag may lead to an undesirable delay in securing a response.

To maintain availability when the user is away from the desktop, a mobile device may be configured to receive the user's messages. To set up the mobile device for IM service, the user would need to log out of the message server from the stationary location (e.g., the desktop), and log in to the service using the mobile device, thus registering the IP address of the mobile device. This change of service technique suffers the same disadvantage as the status flag technique, namely that the user must actively change the service. It would not be as cost-effective or as user-friendly to only log in using the mobile device, as mobile service rates are typically much higher than hardwired network connections, and the desktop computer generally has a better keyboard and display.

A similar problem exists with forwarding phone calls or voice mails to a mobile telephone. For example, if an individual leaves the office, calls to the office number or voice mails left at the office can be forwarded to the individual's mobile telephone. Again, the forwarding feature must be activated by the individual, and often this step is forgotten, especially for short trips away from the office area.

The present invention is directed to overcoming, or at least reducing the effects of, one or more of the problems set forth above.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention may be understood by reference to the following description taken in conjunction with the accompanying drawings, in which like reference numerals identify like elements, and in which:

FIG. **1** is a simplified block diagram of a communications system in accordance with one embodiment of the present invention;

FIG. **2** is a communication flow diagram illustrating the operation of the communications system of FIG. **1**; and

FIG. **3** is a flow diagram of a method for routing messages in accordance with another embodiment of the present invention.

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings and are herein described in detail. It should be understood, however, that the description herein of specific embodiments is not intended to limit the invention to the particular forms disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Illustrative embodiments of the invention are described below. In the interest of clarity, not all features of an actual implementation are described in this specification. It will of course be appreciated that in the development of any such actual embodiment, numerous implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which will vary from one implementation to another. Moreover, it will be appreciated that such a development effort might be complex and time-consuming, but would nevertheless be a routine undertaking for those of ordinary skill in the art having the benefit of this disclosure.

Referring now to the figures, and in particular, to FIG. **1**, a simplified block diagram of a communications system **10** in accordance with the present invention is shown. The communications system **10** includes a stationary unit **15** and a mobile unit **20** through which a user may send and receive messages. The communications system **10** may take on

numerous forms, not all of which are described in complete detail herein. For example, the communications system **10** may be a computer network adapted to transfer electronic messages, such as e-mail or instant messages (IM). The communications system **10** may alternatively be a phone network adapted to handle phone calls. In the illustrated embodiment, the communications system **10** is described as it may be implemented for an IM application, however, the application of the present invention is not so limited and may be applied to numerous other communications applications.

The stationary unit **15** may take on a variety of forms, such as a desktop computer or an office telephone. Likewise, the mobile unit **20** may take on a variety of forms, such as a PDA, a notebook computer, a two-way pager, a radiotelephone in the form of a cordless, cellular, personal communication system (PCS) or other similar-type telephone, or the like. In general, the stationary unit **15** is a unit that is usually installed in one location. The stationary unit **15** may not necessarily be permanently installed. For example, the stationary unit **15** may be a notebook computer that is connected to an internal network at a docking station. The stationary unit **15** communicates with the mobile unit **20** over a communication link **25**. It will be appreciated that the stationary and mobile units **15, 20** may be configured to communicate via numerous communication mediums such as a low power RF link, an infrared (IR) link, a hardwire serial connection (e.g., similar to those used for synchronizing PDAs), etc. For example, air interface standards, such as the Bluetooth standard, the home RF standard, IEEE 802.11, IrDA link, or some other standard may be used.

The stationary unit **15** is coupled to a communication network **30**, such as the Internet, a local area network, a wide area network, or the public switched telephone network (PSTN), to permit voice and/or data communication between the stationary unit **15** and various other communication devices that are interconnected via the communication network **30**. These other communication devices may include, but are not necessarily limited to, telephonic devices, computers, etc.

The mobile unit **20** is also adapted to communicate with a wide area network (WAN) transmitter **35** over a wide area link **40** using a wide area protocol, such as a cellular or pager protocol. The WAN transmitter **35** may also be connected to the communication network **30**.

The communications system **10** further includes a proxy server **45** that intercedes in the message pathway and routes messages to either or both of the stationary and mobile units **15, 20**, depending on their availability. The proxy server **45** may communicate with the stationary unit **15** through the communication network **30** and with the mobile unit **20** through the communication network **30** in conjunction with the WAN transmitter **35**. The proxy server **45** may be resident on a distinct computer as illustrated, or alternatively, the proxy server **45** may be resident on the stationary unit **15**.

Generally speaking, when a user is within the general vicinity of the stationary unit **15**, messages are delivered by the proxy server **45** to the stationary unit **15**. When the user moves out of the vicinity, messages are instead routed to the mobile unit **20**. In operation, the proxy server **45** interfaces with an external messaging system **50**, such as an IM system operated by a third party, through the communication network **30**. The external messaging system **50** may include a plurality of message servers **55** interconnected through a network **60** operated by the messaging system service provider. To the external messaging system **50**, the proxy server **45** appears to be a standard user (i.e., as if the user had logged into the external messaging system **50** directly from the stationary unit **15**). The external messaging system **50** registers the IP address of the proxy server **45** as the destination of messages for the user. Emulation of a user connection may be accomplished by techniques well known to those of ordinary skill in the art, such as link simulation or direct manipulation of the client through an application program interface (API).

To send messages to the user logged in through the proxy server **45**, a remote unit **65** logs in to the external messaging system **50** through the communication network **30**. Messages sent through the remote unit **65** to the user are delivered by the external messaging system **50** to the proxy server **45**. As described in greater detail below, the proxy server **45**, based on availability knowledge, routes the message to either or both of the stationary and mobile units **15, 20**, as appropriate. Replies or original messages are sent by the one of the stationary and mobile units **15, 20** that is available and routed to the proxy server **45**, which, in turn, forwards the message or reply to the external messaging system **50**.

In determining which one of the stationary and mobile units **15, 20** is available for receiving messages, the proxy server **45** maintains a status flag indicative of whether the mobile unit **20** is in the proximity of the stationary unit **15**. The mobile unit **20** is considered to be in the vicinity of the stationary unit **15** when the communication link **25** (e.g., the low power radio frequency (RF) link or a hard-wired serial link) exists therebetween. Typically, when the communication link **25** is active, the user is in the office and available to respond to messages via the stationary unit **15**. Alternatively, when the communication link **25** is lost, it may be assumed that the user has left the office, and is no longer available at the stationary unit **15**. Communications are then routed to the mobile unit **20**.

At some protocol layer, the stationary and mobile units **15, 20** are aware if there is a communication link **25** therebetween. In response to changes in the state of the communication link **25** (i.e., link established, link lost), either one or both of the stationary and mobile units **15, 20** sends a message to the proxy server **45** of the new state. The proxy server **45** then routes traffic through the communication network **30** to the stationary unit **15** or through the WAN transmitter **35** to the mobile unit **20**, as appropriate. For messages sent to the stationary unit **15**, the proxy server **45** may be configured to send copies of the messages to the mobile unit **25** (e.g., concurrently or in batches) or vice-a-versa to keep the stationary and mobile units **15, 20** synchronized.

In the illustrated embodiment, the stationary unit **15** executes a software application **70** including a messaging client **72**, a service discovery layer **74**, and a communication layer **76**. Likewise, the mobile unit **20** executes a software application **80** including a messaging client **82**, a service discovery layer **84**, and a communication layer **86**. The communication layers **76, 86** handle the basic level communication (i.e., modulation/demodulation of the baseband signal) between the stationary and mobile units **15, 20**. The service discovery layers **74, 84** determine the respective capabilities of the stationary and mobile units **15, 20**. The messaging clients **72, 82** provide the interface through which the user exchanges messages with the remote unit **65** through the external messaging system **50**. The specific constructs of the messaging clients **72, 82**, service discovery layers **74, 84**, and communication layers **76, 86** depend on the specific external messaging system **50** being communi-

cated with and the particular protocol used for establishing the communication link **25** between the stationary and mobile units **15, 20**. Although the protocols layers **74, 76, 84, 86** and clients **72, 82** are illustrated as being single applications **70, 80**, they may actually be one or more separate applications.

The interaction between the applications **70, 80** and the proxy server **45** for routing messages from the remote unit **65** are described in greater detail in reference to FIG. **2**, which is a communication flow diagram illustrating the operation of the communications system **10**. FIG. **2**. illustrates a variety of transactions issued by the various entities in the communications system **10**.

In a first set of transactions (denoted by reference numerals in the **100**s), the mobile unit **20** is not in the proximity of the stationary link **15** (i.e., no communication link **25**). The user sends a message transaction (Msg1) **100** from the mobile unit **20** to the remote unit **65**. The proxy server **45** receives the message transaction **100** from the WAN transmitter **35** and issues a corresponding message transaction **102** to the remote unit **65** through the communication network **30** to the external messaging system **50**. The external messaging system **50**, in turn, forwards the message transaction **102** to the remote unit **65**. A reply message transaction (Reply1) **104** is sent back by the remote unit **65** through the same path to the proxy sever **45**. The proxy server **45** sends a corresponding reply message transaction **106** via the WAN transmitter **30** to the mobile unit **20**. Although not illustrated, the proxy server **45** may optionally send a copy of the reply message to the stationary unit **15** to maintain synchronization.

In a second set of transactions (denoted by reference numerals in the **200**s), the mobile unit **20** establishes the communication link **25** with the stationary unit **15**, and the proxy server **45** is reconfigured accordingly. The communication layer **86** of the mobile unit **20** periodically issues query transactions **200, 202, 204** to determine if the stationary unit **15** is near. The query transaction **204** is received by the communication layer **76** of the stationary unit **15** indicating proximity, and the communication layers **76, 86** issue connect transactions **208, 210** to their respective service discovery layers **74, 84**. The service discovery layers **74, 84** share an information exchange transaction **212** to identify themselves and exchange operating parameters. After the information exchange, the service discovery layers **74, 84** issue connection notification transactions **214, 216** to their respective messaging clients **72, 82**. The mobile client **82** sends a messaging status update transaction **218** to the stationary client **82**, which sends a corresponding status update transaction **220** to the proxy server **45**. It is conceivable that either or both of the mobile client **82** and the stationary client **72** may notify the proxy server **45**. The clients **72, 82** then exchange a disable transaction **222** to deactivate the mobile client **82**.

In a third set of transactions (denoted by reference numerals in the **300**s), the user present at the stationary unit **15** issues a message transaction (Msg2) **300** addressed to the remote unit **65**. The proxy server **45** intercepts the message transaction **300** and issues a corresponding transaction **302** through the communication network **30** to the external messaging system **50**. The external messaging system **50**, in turn, forwards the message transaction **302** to the remote unit **65**. A copy of the message may be sent by the stationary client **15** via a copy transaction **304** to the mobile unit **20** for synchronization purposes. A reply message transaction (Reply2) **306** is sent back by the remote unit **65** through the same path to the proxy sever **45**. The proxy server **45** sends a corresponding reply message transaction **308** via the communication network **30** to the stationary unit **15**. Again, a copy transaction **310** may be issued by the stationary client **72** to the mobile client **82** to maintain synchronization.

In a fourth set of transactions (denoted by reference numerals in the **400**s), the user moves out of the vicinity of the stationary unit **15**, and the communication link **25** is lost. The stationary and mobile communication layers **76, 86** send connection lost transactions **400, 402** to their respective service discovery layers **74, 84**, which forward mobile unit lost transactions **404, 406** to the stationary and mobile clients **72, 82**. The mobile client **82** issues a status update transaction **408** through the WAN transmitter **35** to the proxy server **45** indicating the status change. Again, it is conceivable that either or both of the mobile client **82** and the stationary client **72** may notify the proxy server **45** of the status change. The proxy server **45** then issues a disable transaction **410** to deactivate the stationary client **72**.

In a fifth set of transactions (denoted by reference numerals in the **500**s), the remote unit sends a message transaction (Msg3) **500** to the proxy server **45**. The proxy server **45** issues a corresponding transaction **502** to the mobile client **82** via the WAN transmitter **35**, and a reply transaction (Reply3) **504** is received by the proxy server **45**. The proxy server **45** issues a corresponding transaction **506** to the remote unit **65** via the routing path described above.

Turning now to FIG. **3**, a flow diagram of a method for routing messages in accordance with another embodiment of the present invention is provided. In block **600**, the status of a communication link **25** between a mobile unit **20** and a stationary unit **15** is monitored. Monitoring the communication link **25** may include receiving a notification message from at least one of the stationary unit **15** and the mobile unit **20** in response to the communication link **25** being established or lost. A message is received in block **610**, and the message is routed to one of the stationary unit **15** and the mobile unit **20** based on the status of the communication link **25** in block **620**.

For example, the message is routed to the mobile unit **20** in response to the communication link **25** being inactive and to the stationary unit **15** in response to the communication link **25** being active. Messages may be routed to the stationary unit **15** via a communication network coupled to the stationary unit **15**, and messages may be routed to the mobile unit **20** via a wide area network connection. Copies of the message may be sent to the other unit **15, 20**.

Providing automatic proxy services for routing messages as described herein has numerous advantages. First, users of the messaging system need not worry about manually changing between stationary and mobile connections to the message service when leaving the office area. Also, individuals communicating with the user are more likely to have their messages received and responded to in a timely manner because of the automatic routing. Overall, the efficiency, convenience, and flexibility of the communications system **10** is enhanced, thus allowing a corresponding increase in the productivity of users of the system **10**.

What is claimed is:

1. A communications system, comprising:

a stationary unit adapted to send and receive messages;

a mobile unit adapted to establish a communication link with the stationary unit, the mobile unit being adapted to send and receive messages; and

a proxy server adapted to route messages to one of the stationary unit and the mobile unit based on a status of the communication link and transmit a copy of the

messages to the other of the stationary unit and the mobile unit to keep the stationary and mobile units synchronized.

2. The communications system of claim 1, wherein the proxy server is adapted to route messages to the mobile unit in response to the communication link being inactive.

3. The communications system of claim 1, wherein the proxy server is adapted to route messages to the stationary unit in response to the communication link being active.

4. The communications system of claim 1, wherein at least one of the stationary unit and the mobile unit is adapted to notify the proxy server of a change in the status of the communication link.

5. The communications system of claim 1, further comprising:

a communication network coupling the proxy server to the stationary unit; and

a wide area network transmitter adapted to allow communication between the proxy server and the mobile unit.

6. The communications system of claim 5, wherein the wide area transmitter is coupled to the communication network.

7. The communications system of claim 1, wherein the proxy server and the stationary unit are hosted by a single computer.

8. The communications system of claim 1, wherein the stationary unit comprises at least one of a desktop computer and a telephone.

9. The communications system of claim 1, wherein the mobile unit comprises at least one of a personal data assistant, a notebook computer, a two-way pager, and a radiotelephone.

10. The communications system of claim 1, wherein the communication link comprises at least one of a wireless link and a hard-wired connection.

11. A communications system, comprising:

a communication network;

a wide area network transmitter coupled to the communication network;

a stationary unit coupled to the communication network adapted to send and receive messages over the communication network;

a mobile unit adapted to establish a first communication link with the stationary unit and a second communication link with the wide area network transmitter, the mobile unit being further adapted to send and receive messages over the second communication link; and

a proxy server coupled to the communication network and adapted to route messages to one of the stationary unit and the mobile unit based on a status of the first communication link and transmit a copy of the messages to the other of the stationary unit and the mobile unit to keep the stationary and mobile units synchronized.

12. The communications system of claim 11, wherein the proxy server is adapted to route messages to the mobile unit via the wide area network transmitter in response to the first communication link being inactive.

13. The communications system of claim 11, wherein the proxy server is adapted to route messages to the stationary unit via the communications network in response to the first communication link being active.

14. A method for routing messages, comprising:

monitoring the status of a communication link between a mobile unit and a stationary unit;

receiving a message; and

routing the message to one of the stationary unit and the mobile unit based on the status of the communication link and transmitting a copy of the message to the other of the stationary unit and the mobile unit to keep the stationary and mobile units synchronized.

15. The method of claim 14, wherein routing the message comprises routing the message to the mobile unit in response to the communication link being inactive.

16. The method of claim 14 wherein routing the message comprises routing the message to the stationary unit in response to the communication link being active.

17. The method of claim 14, monitoring the status of the communication link comprises receiving a notification message from at least one of the stationary unit and the mobile unit in response to a change in the status of the communication link.

18. The method of claim 14, further comprising:

communicating with the stationary unit via a communication network coupled to the stationary unit; and

communicating with the mobile unit via a wide area network connection.

19. A program storage device encoded with instructions, that, when executed by a computer, perform a method for routing messages, the method comprising:

monitoring the status of a communication link between a mobile unit and a stationary unit;

receiving a message; and

routing the message to one of the stationary unit and the mobile unit based on the status of the communication link and transmitting a copy of the message to the other of the stationary unit and the mobile unit to keep the stationary and mobile units synchronized.

20. A communications system, comprising:

means for monitoring the status of a communication link between a mobile unit and a stationary unit;

means for receiving a message; and

means for routing the message to one of the stationary unit and the mobile unit based on the status of the communication link and transmitting a copy of the message to the other of the stationary unit and the mobile unit to keep the stationary and mobile units synchronized.

* * * * *